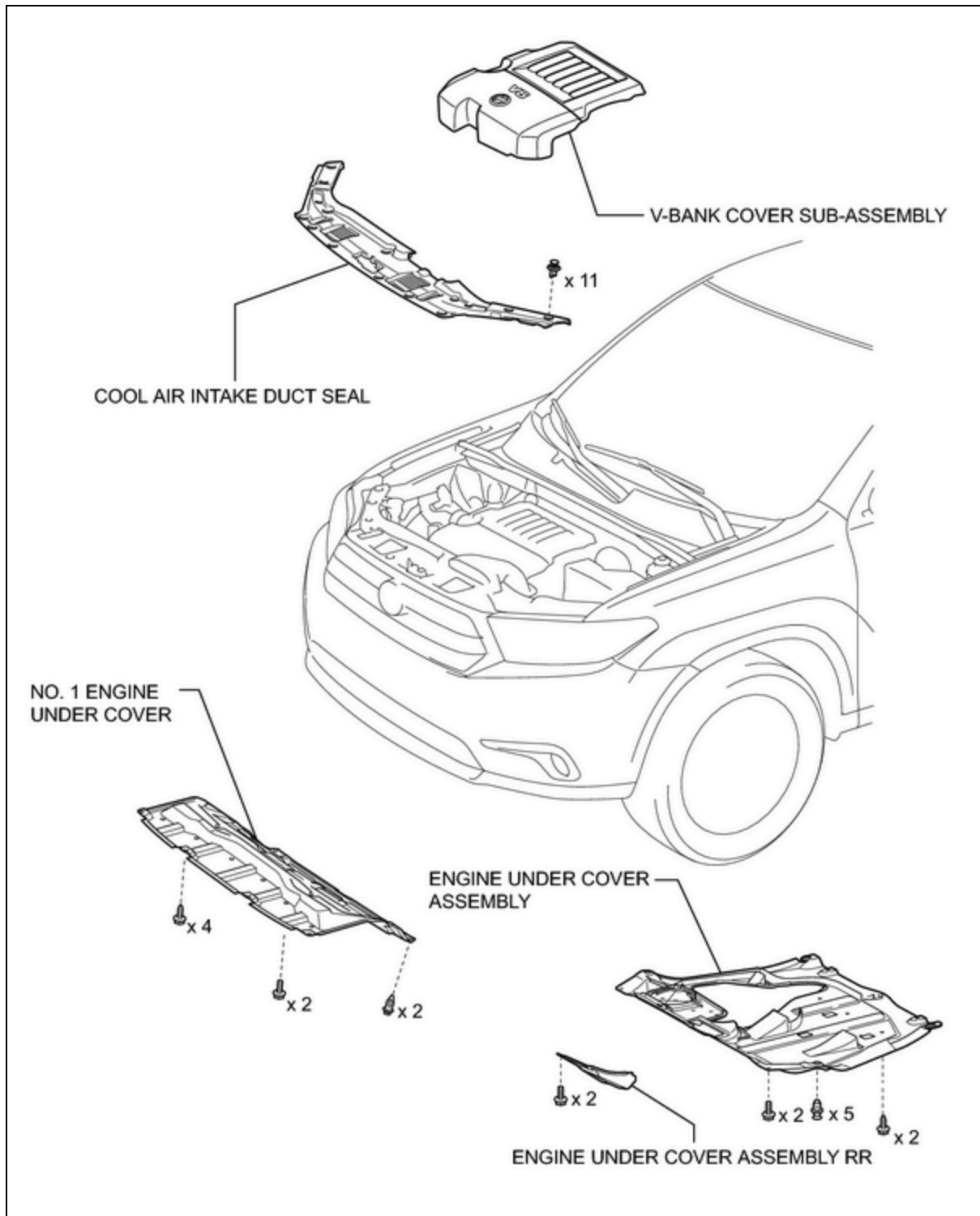


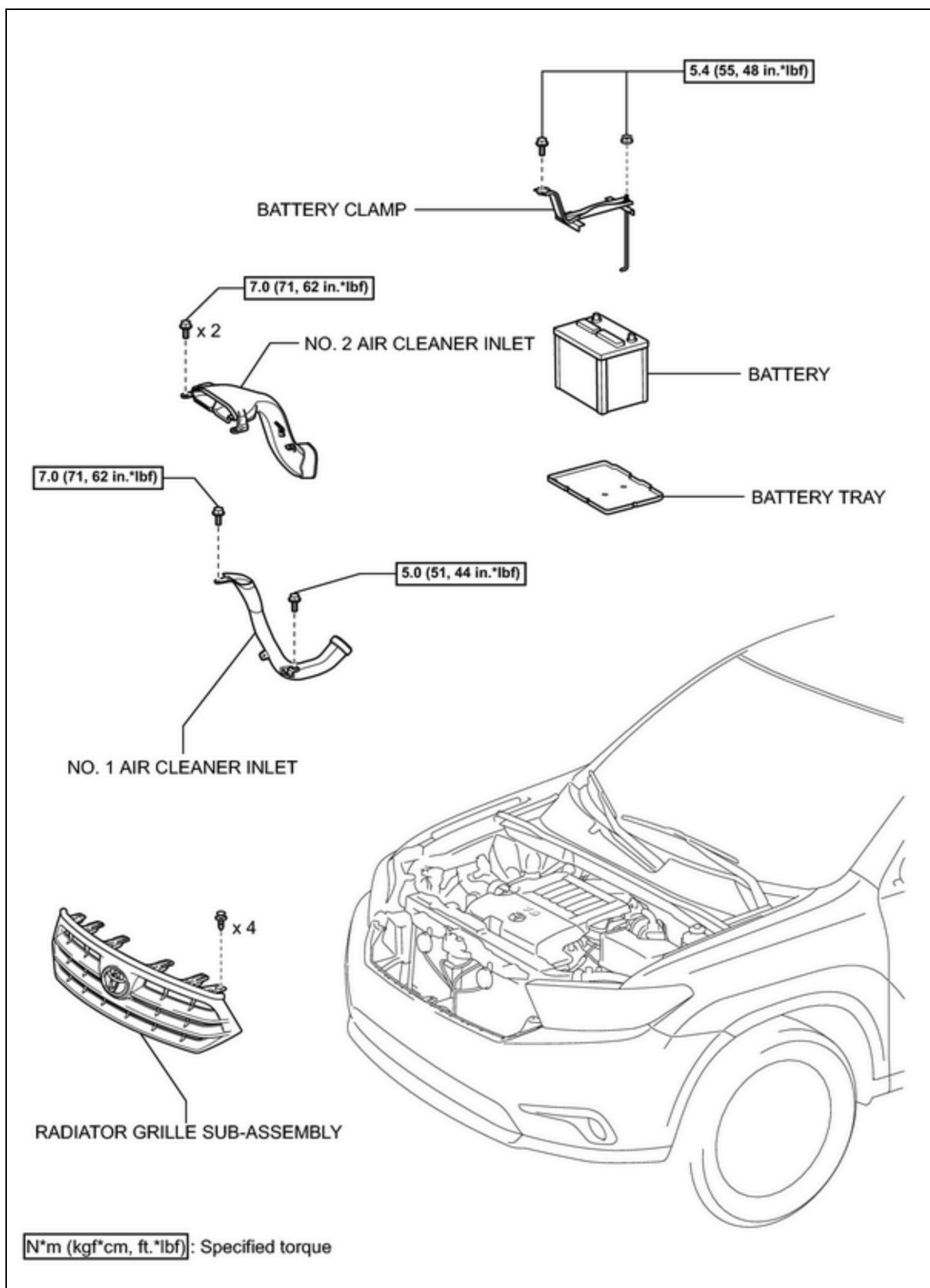
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<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 - ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: COMPONENTS; 2013 MY Highlander [08/2012 - ]		

## COMPONENTS

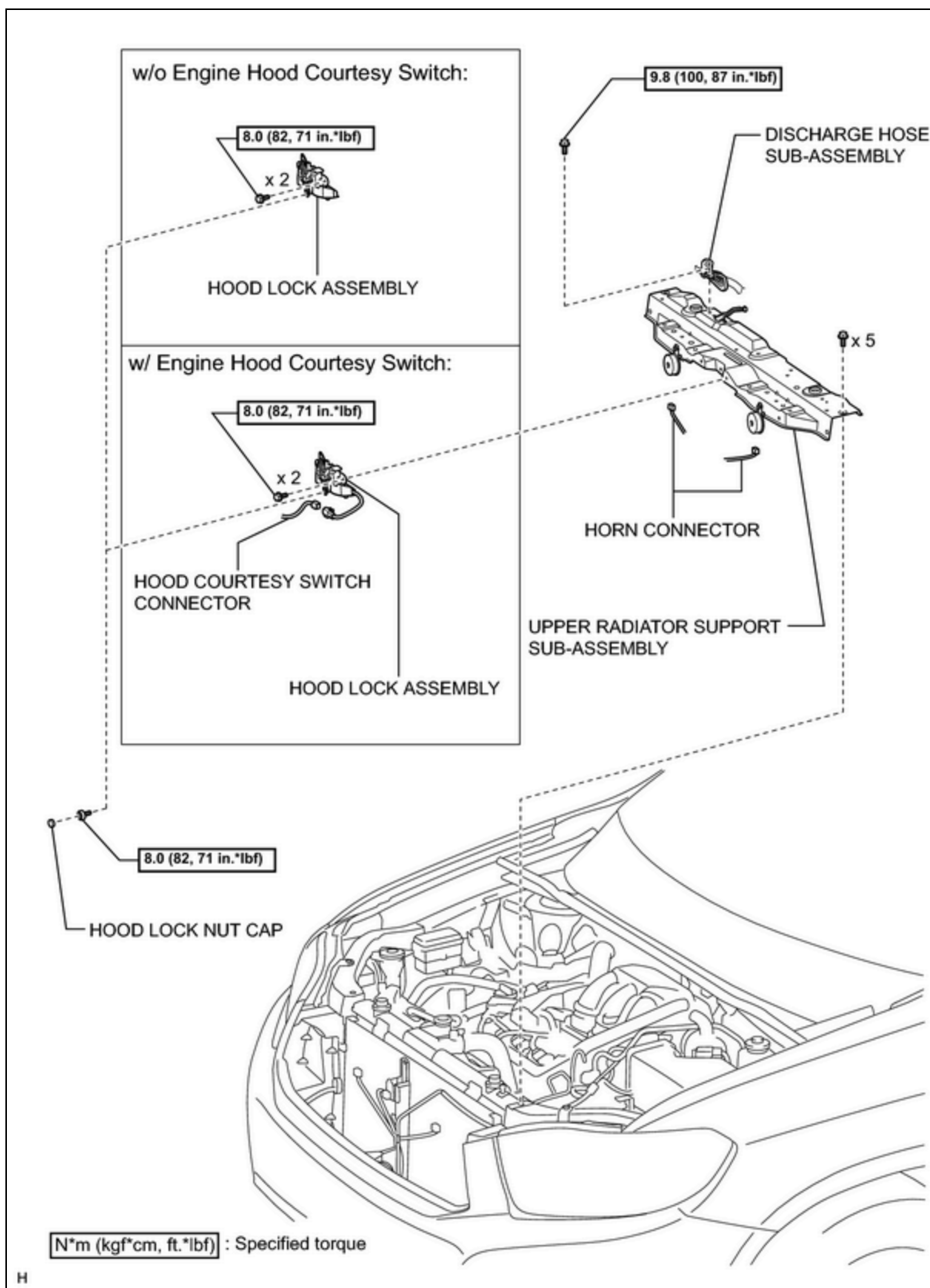
## ILLUSTRATION



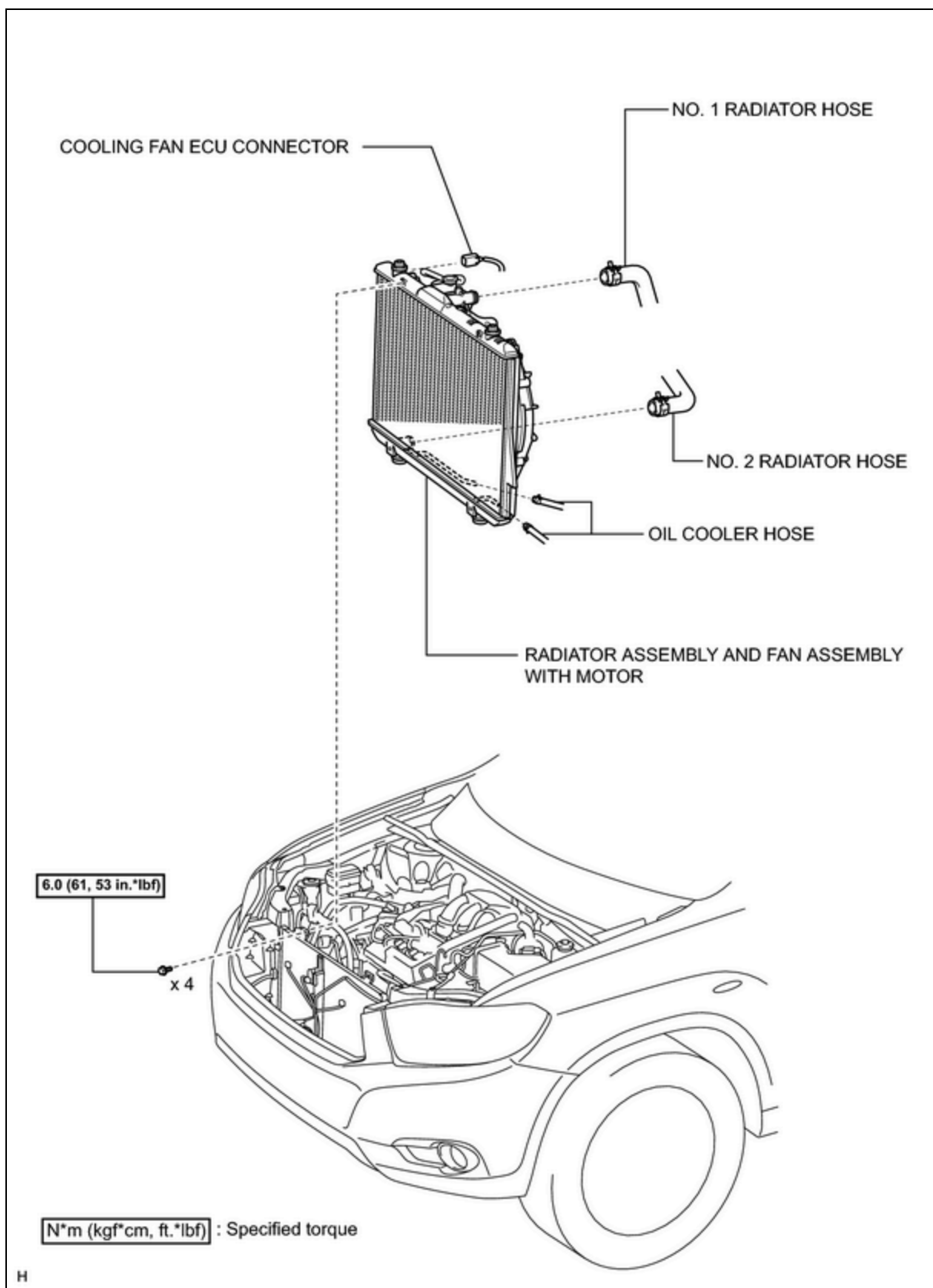
## ILLUSTRATION



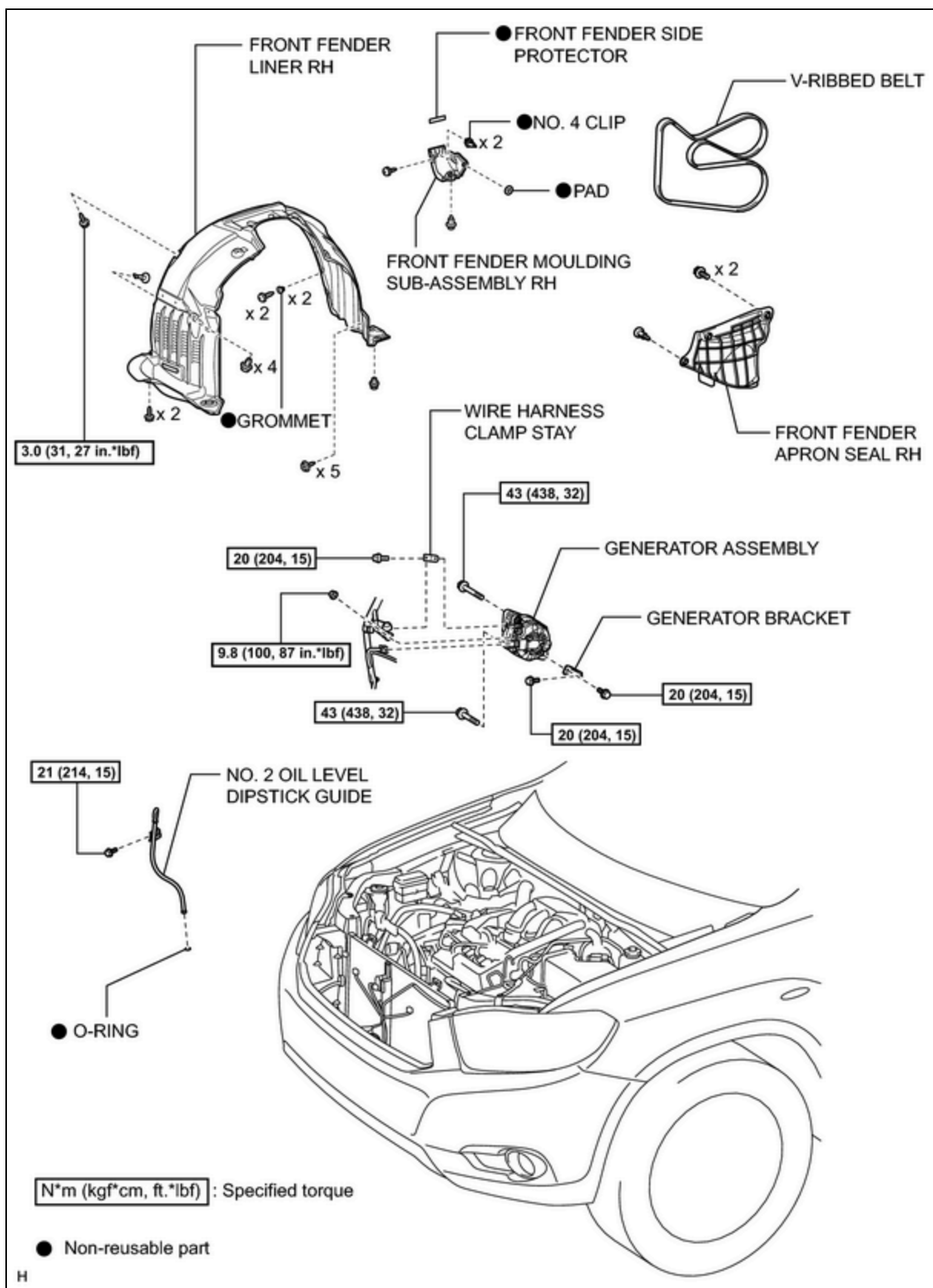
## ILLUSTRATION



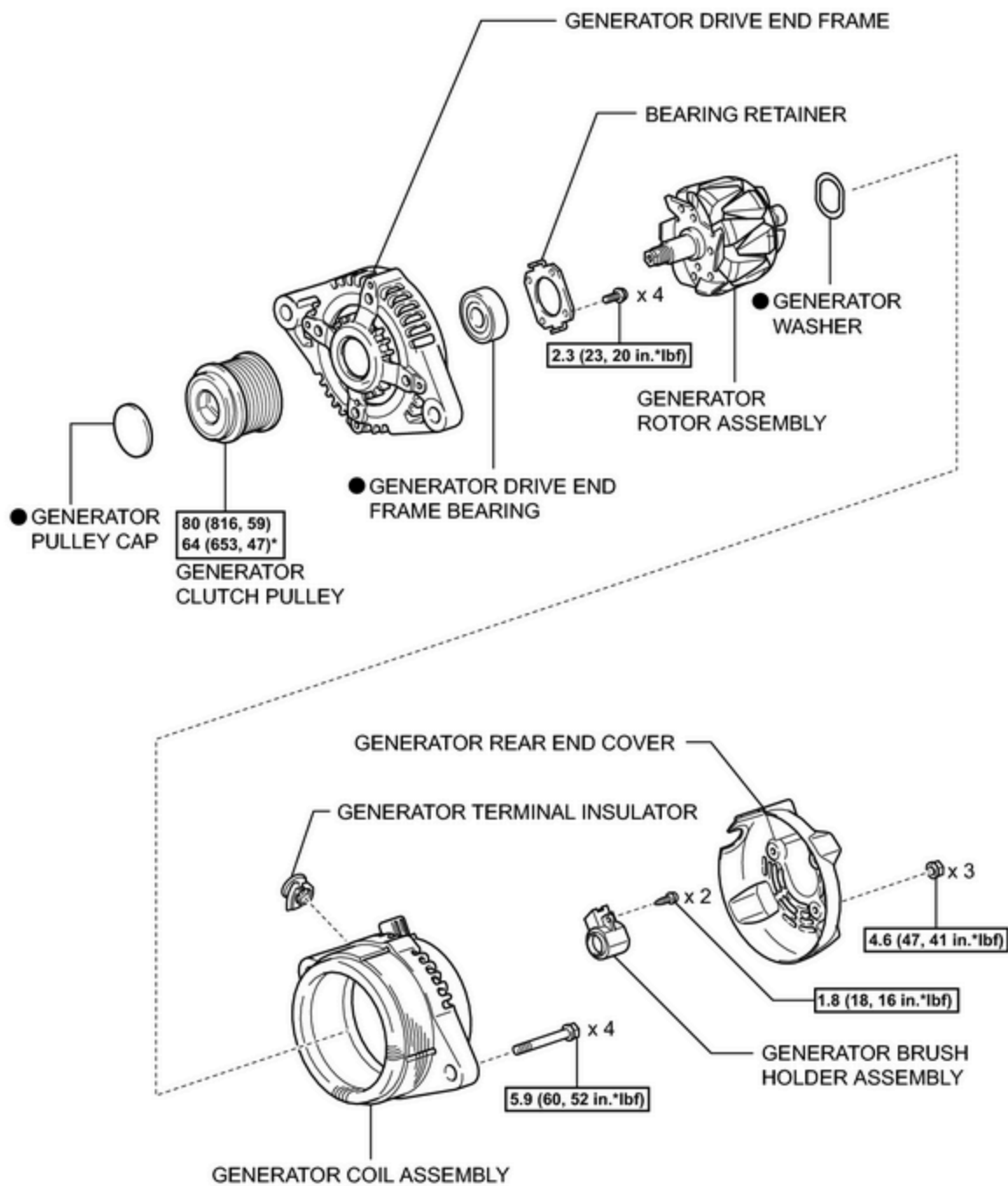
## ILLUSTRATION



## ILLUSTRATION



## ILLUSTRATION



N\*m (kgf\*cm, ft.\*lbf) : Specified torque

\* For use with SST

● Non-reusable part



<b>Last Modified:</b> 4-14-2021	6.10:8.0.50	<b>Doc ID:</b> RM000001ONP03NX
<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 - ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: REMOVAL; 2013 MY Highlander [08/2012 - ]		

## REMOVAL

### 1. REMOVE FRONT WHEEL RH

### 2. REMOVE ENGINE UNDER COVER ASSEMBLY [INFO](#)

### 3. REMOVE NO. 1 ENGINE UNDER COVER [INFO](#)

### 4. REMOVE FRONT FENDER MOULDING SUB-ASSEMBLY RH

#### HINT:

Use the same procedure for the RH side and LH side [INFO](#) .

### 5. REMOVE FRONT FENDER LINER RH [INFO](#)

### 6. REMOVE FRONT FENDER APRON SEAL RH [INFO](#)

### 7. DRAIN ENGINE COOLANT [INFO](#)

### 8. REMOVE V-BANK COVER SUB-ASSEMBLY [INFO](#)

### 9. REMOVE COOL AIR INTAKE DUCT SEAL [INFO](#)

### 10. REMOVE BATTERY [INFO](#)

### 11. REMOVE NO. 2 AIR CLEANER INLET [INFO](#)

### 12. REMOVE NO. 1 AIR CLEANER INLET [INFO](#)

### 13. DISCONNECT NO. 1 RADIATOR HOSE [INFO](#)

### 14. DISCONNECT NO. 2 RADIATOR HOSE [INFO](#)

### 15. DISCONNECT OIL COOLER HOSE [INFO](#)

### 16. DISCONNECT COOLING FAN ECU CONNECTOR [INFO](#)

### 17. REMOVE RADIATOR GRILLE SUB-ASSEMBLY [INFO](#)

### 18. REMOVE HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch) [INFO](#)

### 19. REMOVE HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch) [INFO](#)

### 20. REMOVE UPPER RADIATOR SUPPORT SUB-ASSEMBLY [INFO](#)

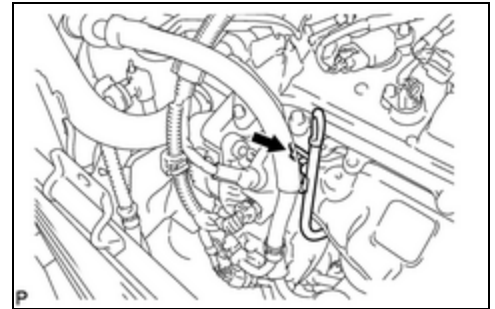
### 21. SEPARATE COOLER CONDENSER ASSEMBLY [INFO](#)

### 22. REMOVE RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR [INFO](#)

### 23. REMOVE NO. 2 OIL LEVEL DIPSTICK GUIDE



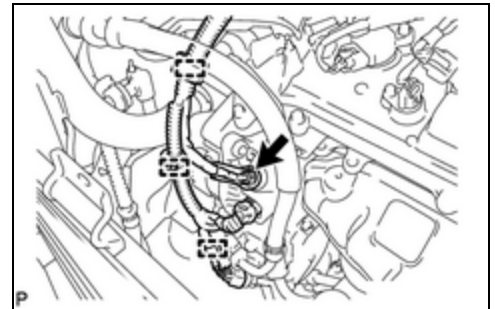
(a) Remove the bolt and the No. 2 oil level dipstick guide.



## 24. REMOVE V-RIBBED BELT INFO

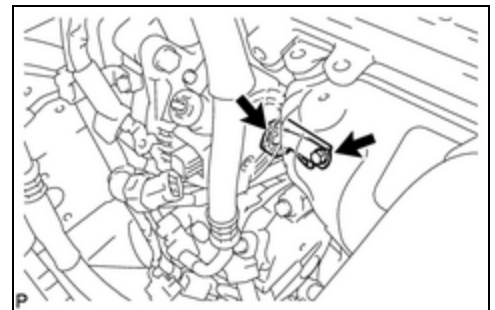
## 25. REMOVE GENERATOR ASSEMBLY

(a) Remove the terminal cap.

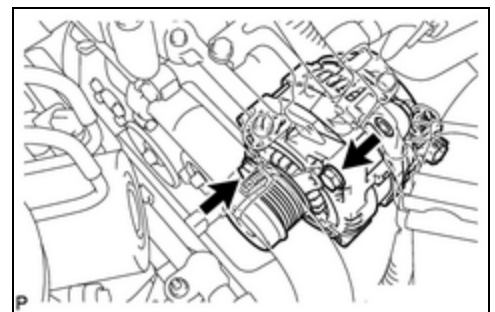


- (b) Remove the nut and disconnect the wire harness from terminal B.
- (c) Disconnect the generator connector from the generator assembly.
- (d) Disconnect the connector from the compressor and magnetic clutch.
- (e) Disconnect the 3 wire harness clamps.

(f) Remove the 2 bolts, and then disconnect the bracket.

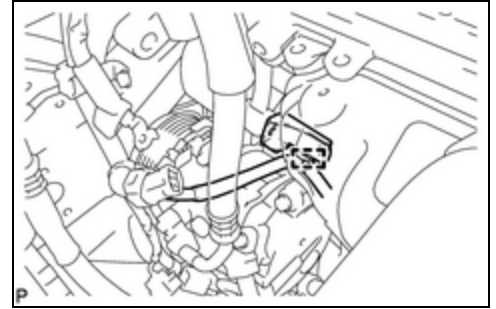


(g) Remove the 2 bolts and the generator assembly.

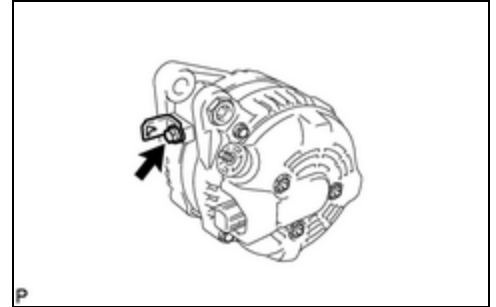




(h) Disconnect the wire harness clamp, and then remove the generator bracket.



(i) Remove the bolt and the wire harness clamp stay.

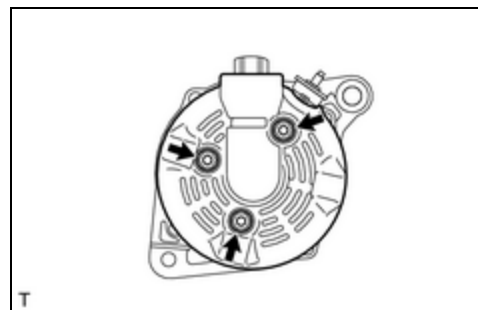


<b>Last Modified:</b> 4-14-2021	6.10:8.0.50	<b>Doc ID:</b> RM000001ONQ079X
<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 -     ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: DISASSEMBLY; 2013 MY Highlander [08/2012 -     ]		

## **DISASSEMBLY**

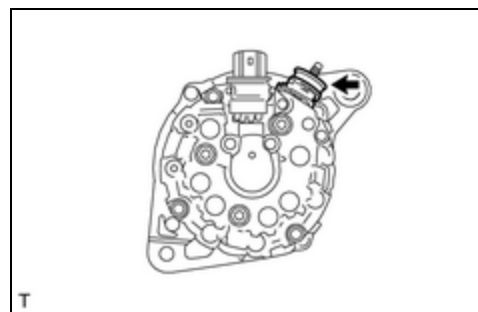
### **1. REMOVE GENERATOR REAR END COVER**

- (a) Remove the 3 nuts and generator rear end cover.



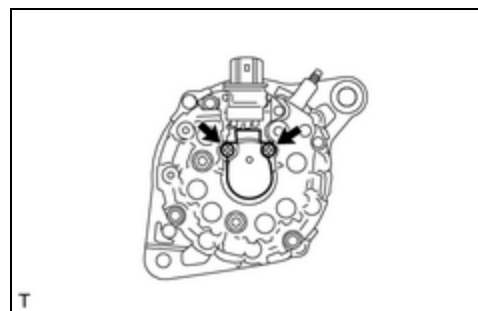
### **2. REMOVE GENERATOR TERMINAL INSULATOR**

- (a) Remove the terminal insulator from the generator coil.



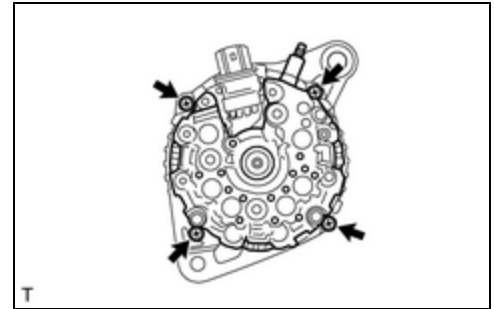
### **3. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY**

- (a) Remove the 2 screws and brush holder from the generator coil.



### **4. REMOVE GENERATOR COIL ASSEMBLY**

(a) Remove the 4 bolts.



(b) Using SST, remove the generator coil assembly.

**SST: 09950-40011**

09951-04020

09952-04010

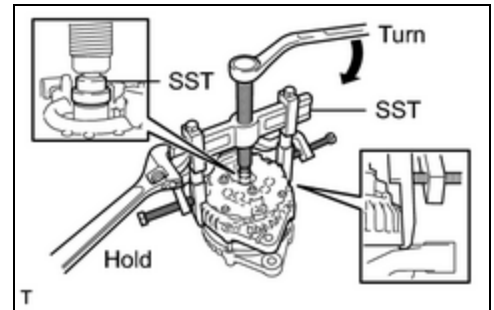
09953-04020

09954-04010

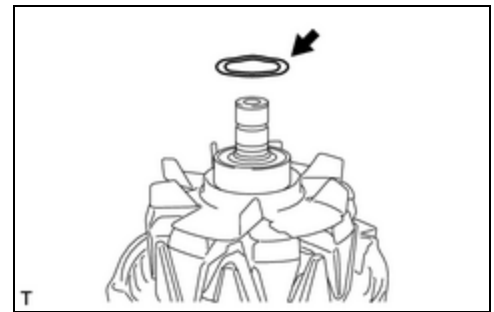
09955-04071

09957-04010

09958-04011



(c) Remove the generator washer.

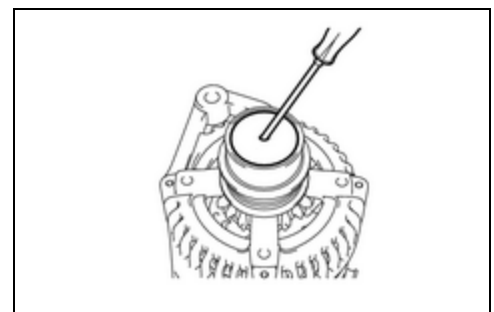


## 5. REMOVE GENERATOR CLUTCH PULLEY

(a) Using a screwdriver, puncture the center of the generator pulley cap and pry it off.

### NOTICE:

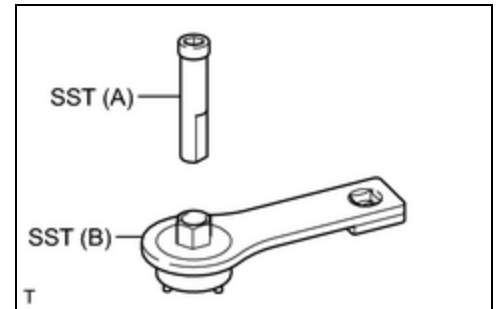
Do not reuse the generator pulley cap.



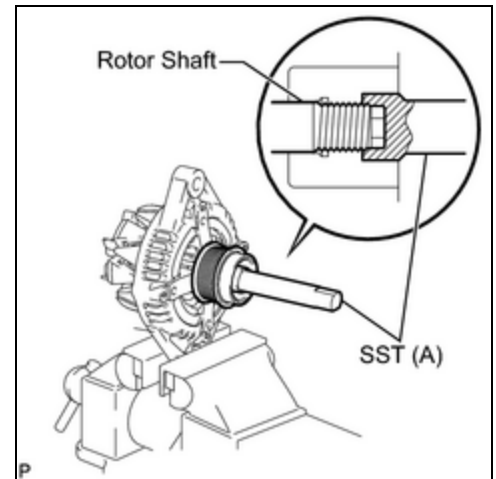
(b) Mount the generator drive end frame in a vise tightly.

(c) Confirm SST (A) and (B) shown in the illustration.

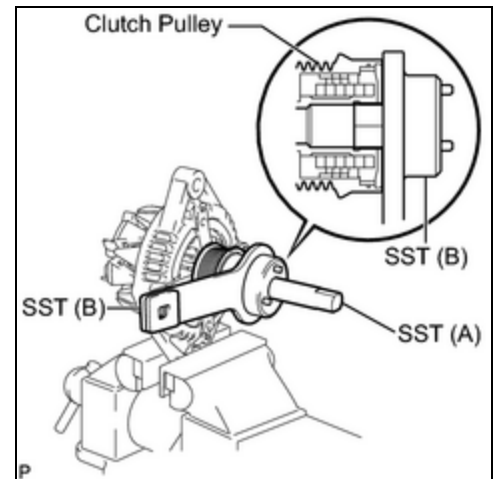
**SST: 09820-63021**



(d) Place the rotor shaft end into SST (A).



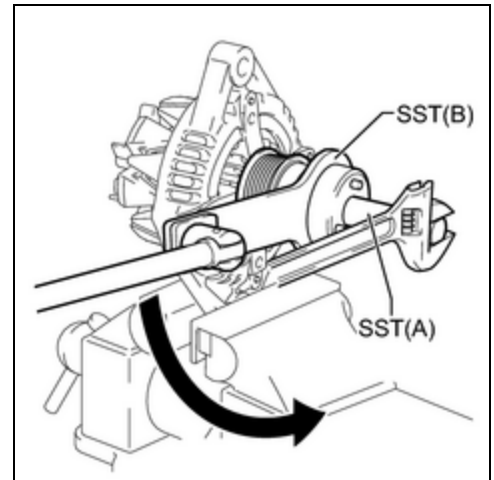
(e) Fit SST (B) to the clutch pulley.



(f) Loosen the pulley by turning SST (B) in the direction shown in the illustration.

**NOTICE:**

- Check that the drive end frame remain secure in the vise.
- Hold SST (A) tightly during the operation.

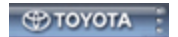
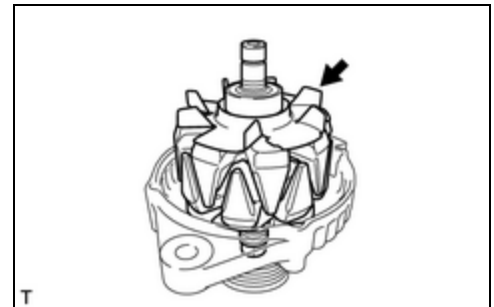


(g) Remove SST from the generator assembly.

(h) Remove the clutch pulley from the rotor shaft.

**6. REMOVE GENERATOR ROTOR ASSEMBLY**

(a) Remove the generator rotor assembly.



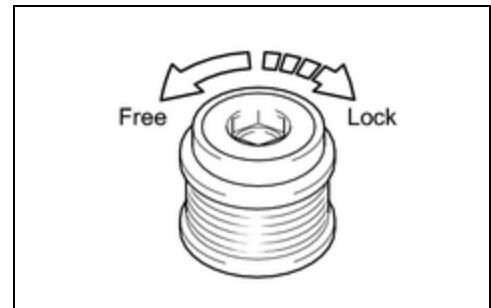
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<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 - ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: INSPECTION; 2013 MY Highlander [08/2012 - ]		

## **INSPECTION**

### **1. INSPECT GENERATOR CLUTCH PULLEY**

- (a) Hold the center of the pulley, and confirm that the outer ring turns counterclockwise and does not turn clockwise.

If the result is not as specified, replace the clutch pulley.



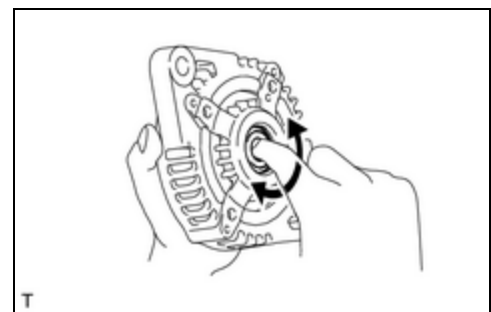
### **2. INSPECT GENERATOR DRIVE END FRAME BEARING**

- (a) Check that the bearing is not rough or worn.

OK:

The bearing rotates smoothly.

If the bearing does not rotate smoothly, replace the bearing.



### **3. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY**

- (a) Using vernier calipers, measure the length of the exposed brushes.

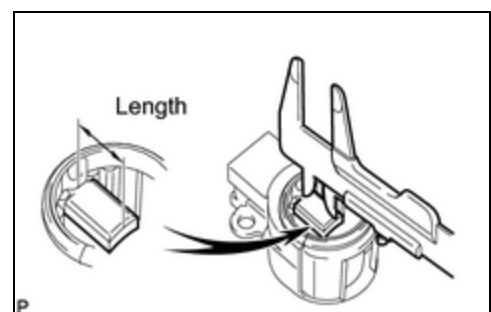
Standard exposed length:

9.5 to 11.5 mm (0.374 to 0.453 in.)

Minimum exposed length:

4.5 mm (0.177 in.)

If the exposed length is less than the minimum, replace the brush holder assembly.

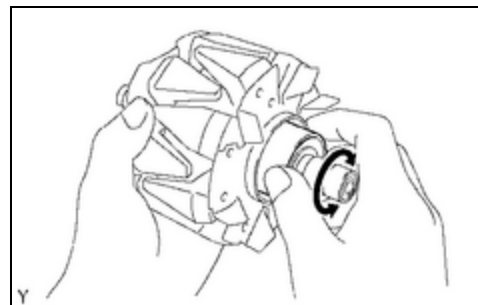


### **4. INSPECT GENERATOR ROTOR ASSEMBLY**



(a) Check that the generator rotor bearing is not rough or worn.

If necessary, replace the generator rotor assembly.



(b) Check the generator rotor for an open circuit.

(1) Using an ohmmeter, measure the resistance between the slip rings.

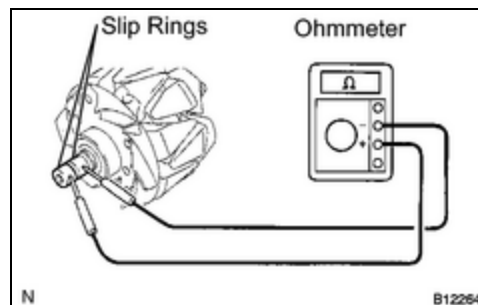
Standard resistance:

**w/o Towing Package and Rear Heater Assembly**

**w/ Towing Package or Rear Heater Assembly**

CONDITION	SPECIFIED CONDITION
Approx. 20°C (68°F)	2.3 to 2.7 $\Omega$ (100 A and 130 A type)

CONDITION	SPECIFIED CONDITION
Approx. 20°C (68°F)	1.5 to 1.9 $\Omega$ (150 A type)



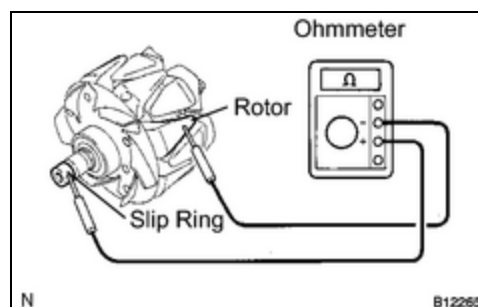
If the result is not as specified, replace the generator rotor assembly.

(c) Check the rotor for a short to ground.

(1) Using an ohmmeter, measure the resistance between the slip ring and rotor.

Standard resistance:

TESTER CONDITION	SPECIFIED CONDITION
Slip ring - Rotor	1 M $\Omega$ or higher



If the result is not as specified, replace the generator rotor assembly.

(d) Using vernier caliper, measure the slip ring diameter.

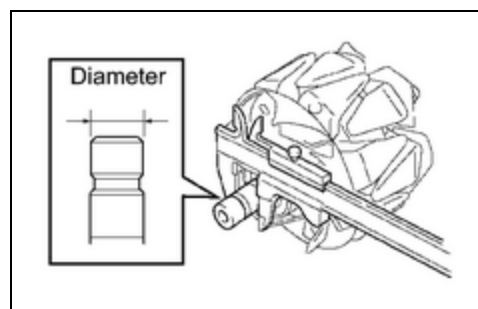
Standard diameter:

14.2 to 14.4 mm (0.559 to 0.567 in.)

Minimum diameter:

14.0 mm (0.551 in.)

If the diameter is less than the minimum, replace the generator rotor assembly.



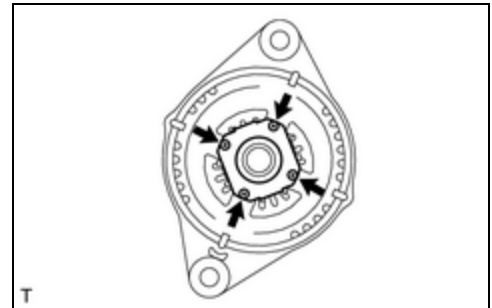


<b>Last Modified:</b> 4-14-2021	6.10:8.0.50	<b>Doc ID:</b> RM0000018Z4039X
<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 -     ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: REPLACEMENT; 2013 MY Highlander [08/2012 -     ]		

## REPLACEMENT

### 1. REPLACE GENERATOR DRIVE END FRAME BEARING

- (a) Remove the 4 screws and bearing retainer from the drive end frame.



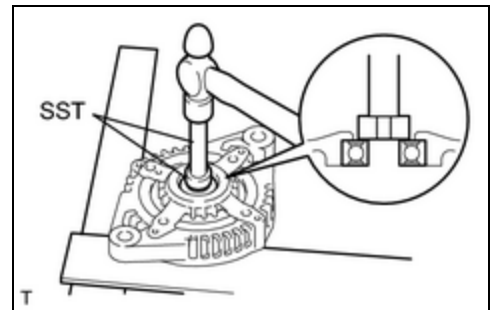
- (b) Using SST and a hammer, tap out the drive end frame bearing from the drive end frame.

**SST: 09950-60010**

09951-00250

**SST: 09950-70010**

09951-07100



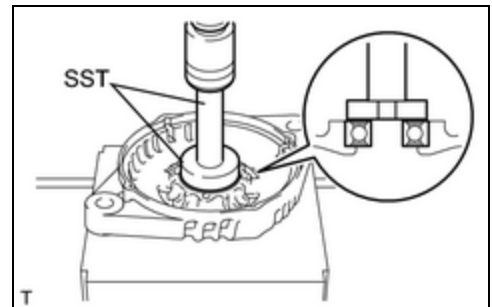
- (c) Using SST and a press, press in a new generator drive end frame bearing.

**SST: 09950-60010**

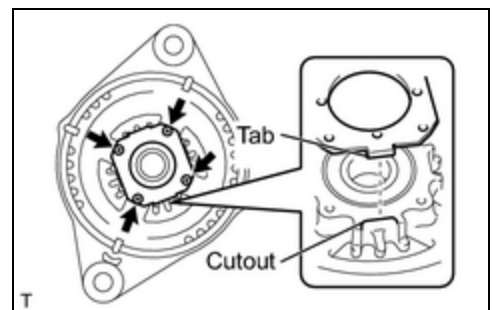
09951-00470

**SST: 09950-70010**

09951-07100



- (d) Fit the tabs on the bearing retainer into the cutouts on the drive end frame to install the bearing retainer.



- (e) Install the 4 screws.

**Torque:**

**2.3 N·m {23 kgf·cm, 20in·lbf}**



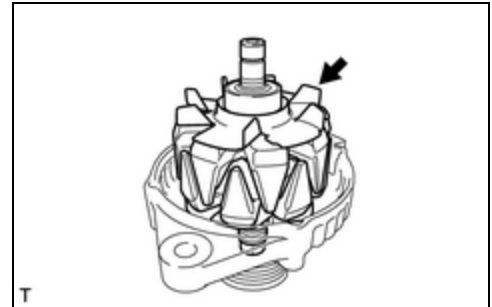
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<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 - ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: REASSEMBLY; 2013 MY Highlander [08/2012 - ]		

## **REASSEMBLY**

### **1. INSTALL GENERATOR ROTOR ASSEMBLY**

(a) Place the drive end frame on the clutch pulley.

(b) Install the generator rotor assembly to the drive end frame.



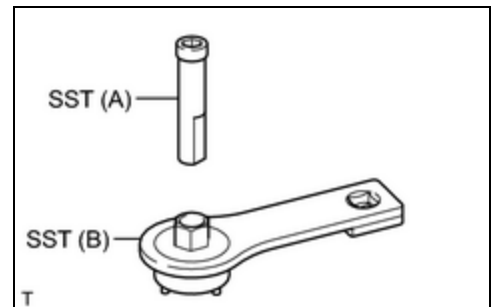
### **2. INSTALL GENERATOR CLUTCH PULLEY**

(a) Temporarily install the clutch pulley onto the rotor shaft.

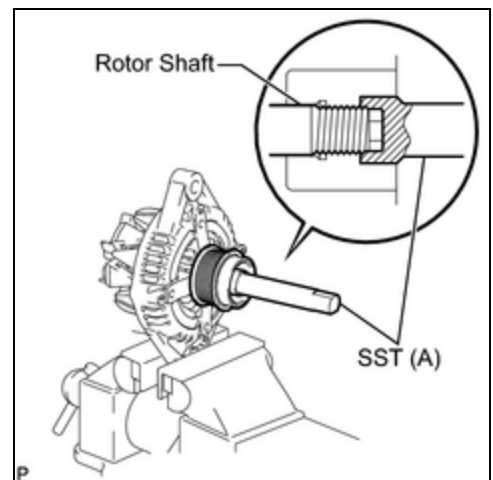
(b) Mount the generator drive end frame in a vise tightly.

(c) Confirm SST (A) and (B) shown in the illustration.

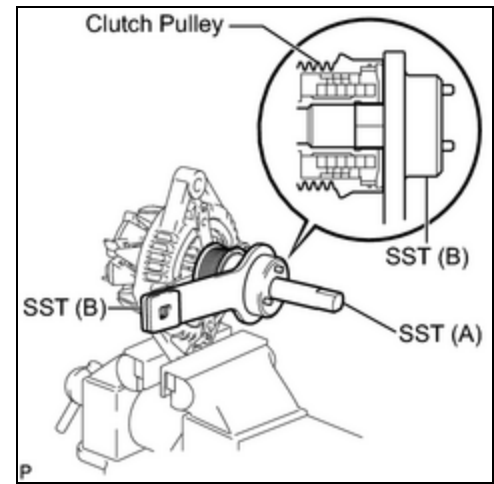
**SST: 09820-63021**



(d) Place the rotor shaft end into SST (A).



(e) Fit SST (B) to the clutch pulley.



(f) Tighten the pulley by turning SST (B) in the direction shown in the illustration.

**Torque:**

**without SST -**

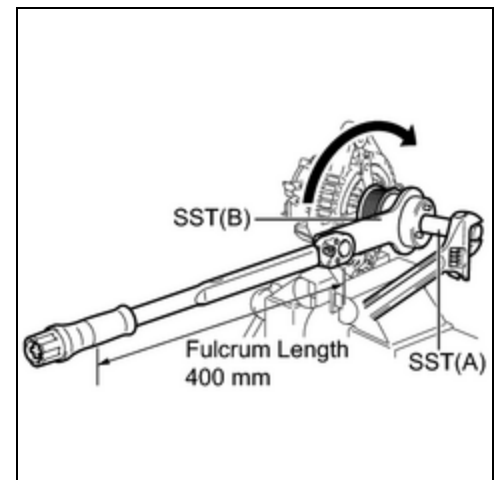
**80 N·m {816 kgf·cm, 59ft·lbf}**

**with SST -**

**64 N·m {653 kgf·cm, 47ft·lbf}**

**NOTICE:**

- The "with SST" torque value is effective when using a torque wrench with a fulcrum length of 400 mm (15.75 in.).
- This torque value is effective when SST is parallel to the torque wrench.
- Hold the generator assembly tightly.



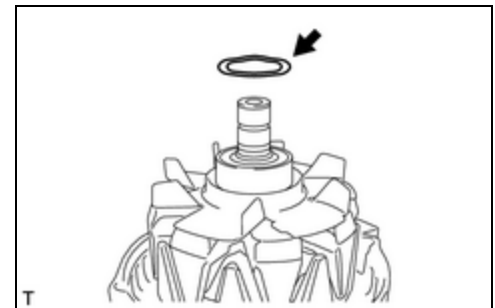
(g) Remove SST from the generator assembly.

(h) Check that the clutch pulley rotates smoothly.

(i) Install a new generator pulley cap to the clutch pulley.

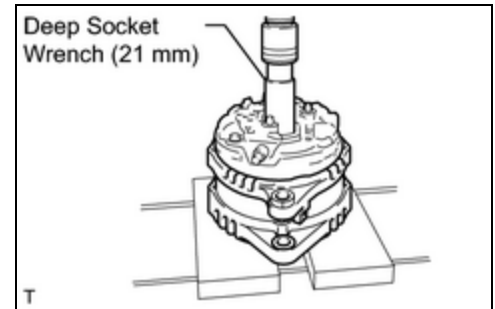
### 3. INSTALL GENERATOR COIL ASSEMBLY

(a) Place a new generator washer on the generator rotor.





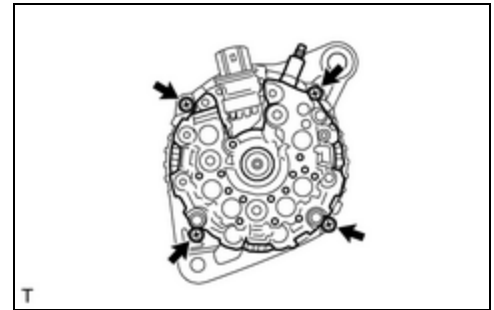
- (b) Using a deep socket wrench (21 mm) and a press, slowly press in the generator coil assembly.



- (c) Install the 4 bolts.

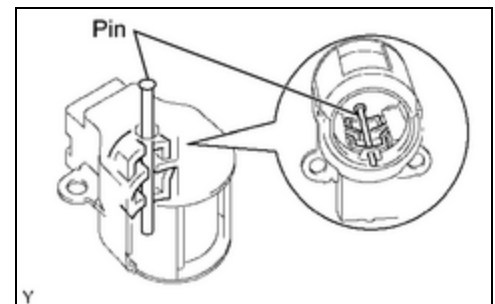
**Torque:**

**5.9 N·m {60 kgf·cm, 52in·lbf}**



#### 4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

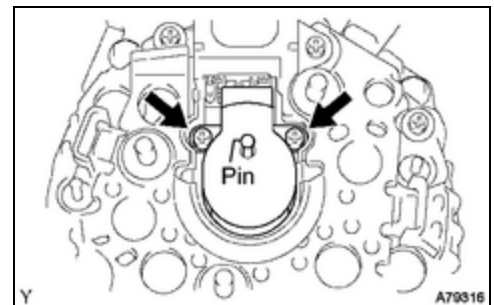
- (a) While pushing the 2 brushes into the generator brush holder assembly, insert a  $\phi 1.0$  mm (0.039 in.) pin into the brush holder hole.



- (b) Install the brush holder assembly to the generator coil with the 2 screws.

**Torque:**

**1.8 N·m {18 kgf·cm, 16in·lbf}**



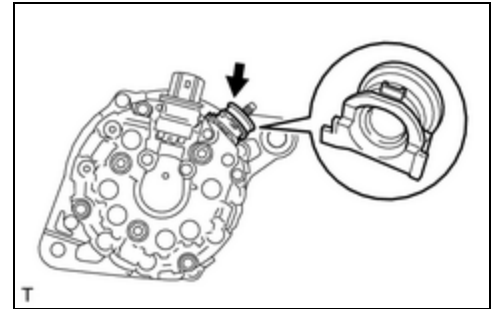
- (c) Pull out the pin from the generator brush holder.

#### 5. INSTALL GENERATOR TERMINAL INSULATOR

(a) Install the terminal insulator to the generator coil.

**NOTICE:**

Pay attention to the installation direction of the terminal insulator.

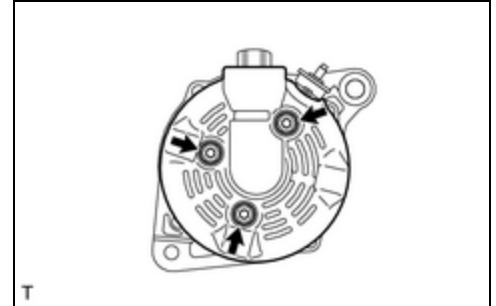


## 6. INSTALL GENERATOR REAR END COVER

(a) Install the generator rear end cover to the generator coil with the 3 nuts.

**Torque:**

**4.6 N·m {47 kgf·cm, 41in·lbf}**



<b>Last Modified:</b> 4-14-2021	6.10:8.0.50	<b>Doc ID:</b> RM000001ONM03LX
<b>Model Year Start:</b> 2013	<b>Model:</b> Highlander	<b>Prod Date Range:</b> [08/2012 -     ]
<b>Title:</b> 2GR-FE CHARGING: GENERATOR: INSTALLATION; 2013 MY Highlander [08/2012 -     ]		

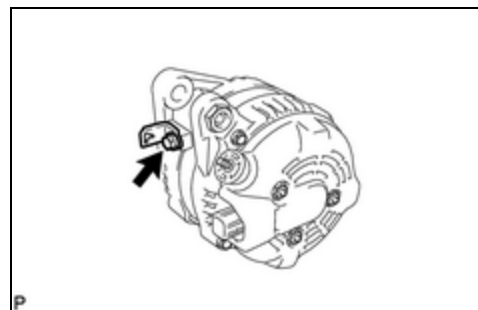
## **INSTALLATION**

### **1. INSTALL GENERATOR ASSEMBLY**

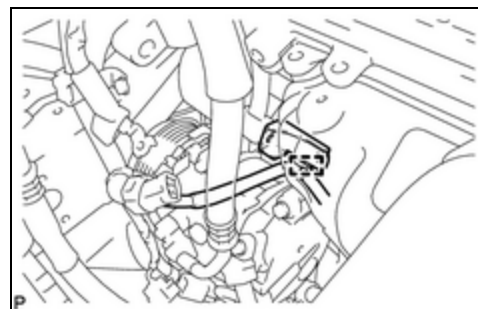
(a) Install the wire harness clamp stay with the bolt.

**Torque:**

**20 N·m {204 kgf·cm, 15ft·lbf}**



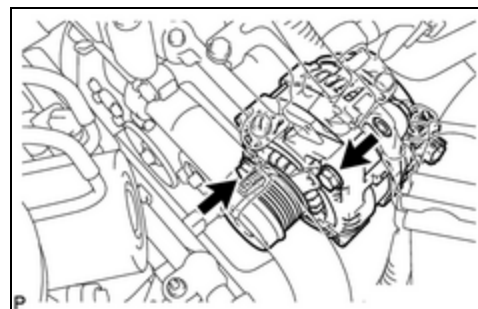
(b) Connect the generator bracket with the wire harness clamp.



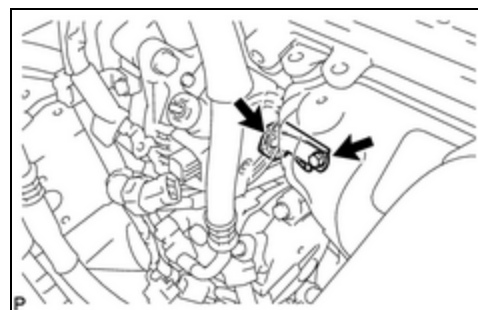
(c) Install generator assembly with the 2 bolts.

**Torque:**

**43 N·m {438 kgf·cm, 32ft·lbf}**



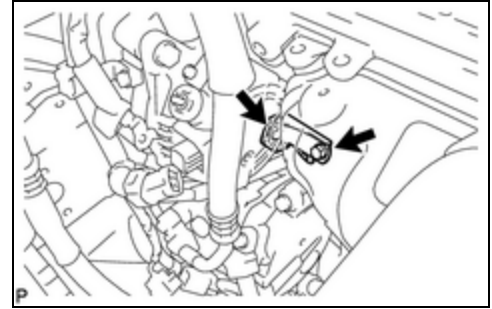
(d) Temporally install the 2 bolts.



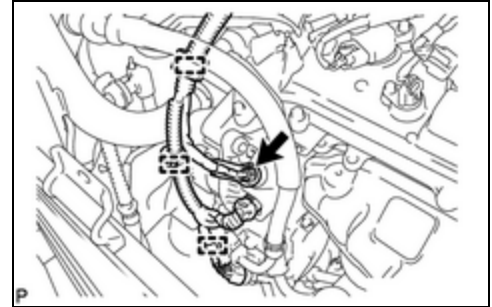
(e) Fully tighten the 2 bolts.

**Torque:**

**20 N·m {204 kgf·cm, 15ft·lbf}**



(f) Connect the generator connector to the generator assembly.



(g) Install the generator wire with the nut.

**Torque:**

**9.8 N·m {100 kgf·cm, 87in·lbf}**

(h) Install the terminal cap.

(i) Connect the 3 wire harness clamps.

(j) Connect the magnetic clutch connector to the compressor and magnetic clutch.

**2. INSTALL V-RIBBED BELT** [INFO](#)

**3. INSTALL NO. 2 OIL LEVEL DIPSTICK GUIDE**

(a) Install a new O-ring to the No. 2 oil level dipstick guide.

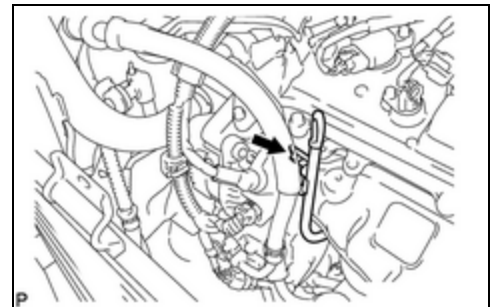
(b) Apply a light coat of engine oil to the O-ring.

(c) Push in the No. 2 oil level dipstick guide end into the No. 1 oil level dipstick guide.

(d) Install the No. 2 oil level dipstick guide with the bolt.

**Torque:**

**21 N·m {214 kgf·cm, 15ft·lbf}**



**4. INSTALL RADIATOR ASSEMBLY AND FAN ASSEMBLY WITH MOTOR** [INFO](#)

**5. INSTALL COOLER CONDENSER ASSEMBLY** [INFO](#)

**6. INSTALL UPPER RADIATOR SUPPORT SUB-ASSEMBLY** [INFO](#)

**7. INSTALL HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch)** [INFO](#)

**8. INSTALL HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch)** [INFO](#)

**9. INSTALL RADIATOR GRILLE SUB-ASSEMBLY** [INFO](#)

**10. CONNECT COOLING FAN ECU CONNECTOR** [INFO](#)

**11. CONNECT OIL COOLER HOSE** [INFO](#)

**12. CONNECT NO. 2 RADIATOR HOSE** [INFO](#)

**13. CONNECT NO. 1 RADIATOR HOSE** [INFO](#)

**14. INSTALL NO. 1 AIR CLEANER INLET** [INFO](#)

**15. INSTALL NO. 2 AIR CLEANER INLET** [INFO](#)

**16. INSTALL BATTERY** [INFO](#)

**17. INSTALL COOL AIR INTAKE DUCT SEAL** [INFO](#)

**18. INSTALL FRONT FENDER APRON SEAL RH** [INFO](#)

**19. INSTALL FRONT FENDER LINER RH** [INFO](#)

**20. INSTALL FRONT FENDER MOULDING SUB-ASSEMBLY RH**

**HINT:**

Use the same procedure for the RH side and LH side [INFO](#) .

**21. ADD ENGINE COOLANT** [INFO](#)

**22. INSPECT FOR COOLANT LEAK** [INFO](#)

**23. INSPECT AUTOMATIC TRANSAXLE FLUID** [INFO](#)

**24. INSPECT FOR OIL LEAK**

**25. INSTALL NO. 1 ENGINE UNDER COVER** [INFO](#)

**26. INSTALL ENGINE UNDER COVER ASSEMBLY** [INFO](#)

**27. INSTALL FRONT WHEEL RH**

**Torque:**

**103 N·m {1050 kgf·cm, 76ft·lbf}**

**28. INSTALL V-BANK COVER SUB-ASSEMBLY** [INFO](#)

